Remarks

Claims 1-16 and 18-20 are pending in this application. Applicants believe that the following remarks render the claims in condition for allowance. Applicants respectfully request reconsideration of the application in view of the remarks.

Summary Of Claimed Invention

The claimed invention is directed to a catalyst system for use with an internal combustion engine that includes a new Perovskite catalyst formulation that maximizes the reduction of HC, CO and NOx under both stoichiometric and lean operating conditions. In addition, the claimed catalyst system uses an additional downstream catalyst to reduce emissions under stoichiometric conditions. It is believed that the newly designed Perovskite-based catalyst is optimized for reducing emissions under lean operating conditions and eliminating oxygen storage capacity by achieving close proximity between the precious metal and NOx-binding elements, such as barium, magnesium and potassium. This is achieved by the claimed Perovskite structure, as more fully described on pages 8-9 of the specification.

More specifically, the claimed modified Perovskite structure provides a desired crystal structure, having a desired ionic radius of the A element versus the B element. Likewise, with this particular crystal structure, Cobalt has a balanced oxidation/reduction property and thus can be placed on the B site. Likewise, Lanthanum provides the desired stability at the A sites. Additionally, for NOx storing and releasing to occur, high capacity, fast storing and releasing kinetics, the Lanthanum ions are substituted with a NOx trapping metal, i.e. barium, magnesium and potassium. It is believed that by substituting a NOx trapping metal with lanthanum, the oxygen vacancies created provide space for bulk nitrate or nitrite formation, to achieve NOx storage, and also accelerate the diffusion of nitrogen atoms inside the Perovskite structure. Finally, the cobalt at the B site can be substituted with a precious metal to increase the activity and selectivity of the Perovskite structure.

EP Reference Fails To Render Claims Obvious

In contrast, the EP 0 941 757 cited reference does not teach the use of a Perovskite structure, nor does it teach the specific substitution called for by the claimed

invention of the Perovskite structure, for the A/B sites to achieve each of the specific functions described above. As set forth on pages 8-9 of the specification, and as described above, the newly designed Perovskite structure is believed to provide improved NOx trapping abilities. The EP second powder composition neither teaches the use of a general Perovskite structure, let alone the one modified Perovskite specifically claimed to provide the increased activity and NOx trapping functions desired for this invention. Accordingly, the EP 0 941 757 reference fails to render the claimed invention obvious.

The cited EP reference also fails to teach a catalyst system the includes the claimed two catalysts. Per the claims, the two distinct catalysts have different compositions, and each catalyst is designed to perform different functions. As an example, the Perovskite composition of the first catalyst is designed to optimize the storage of NOx emissions under lean air/fuel ratios. The second catalyst comprising a PM-Rh catalyst mixture is designed to reduce hydrocarbons, NOx and CO emissions under stoichiometric air/fuel ratios. As set forth in the specification, the general Perovskite structure is not designed to maximize NOx storing and releasing functions. However, the newly developed Perovskite structure, set forth in the claims, is specifically designed to maximize NOx storage and release by providing the requisite close proximity between the precious metal and the NOx trapping metal. The EP reference neither teaches nor suggest the use of two catalysts to perform these two distinct functions.

Second, the claimed catalyst system is directed for use in reducing emissions under lean and stoichiometric air/fuel ratios. In fact, the EP reference is entitled "Device for Purifying Oxygen Rich Exhaust Gas." The EP catalyst is not directed to a catalyst system that is capable of handling both lean and stoichiometric air/fuel ratios, and in particular capable of reducing stoichiometric ratios as well as emission of air fuel ratios greater than 28. See, Figure 1 of the patent application.

These differences result in a catalyst system with a different structure, different catalyst composition, and different functional abilities. For these reasons, Applicants respectfully assert that the claimed invention is neither anticipated nor rendered obvious by the EP reference. Applicants thus respectfully request allowance of the claims. Should the Examiner have any questions, please feel free to contact the undersigned.

CONCLUSION

For the foregoing reasons, Applicants believe that the Office Action of September 7, 2004 has been fully responded to and, in view of the remarks, that the application is in condition for allowance. Applicants respectfully request such an allowance and invite the Examiner to contact the undersigned with any questions.

A check in the amount of $110 is enclosed to cover the Petition fee. Please charge any additional fees or credit any overpayments as a result of the filing of this paper to our Deposit Account No. 02-3978 -- a duplicate of this paper is enclosed for that purpose.

Respectfully submitted,

Haren S. Gandhi et al.

By _____

Sangeeta G. Shah
Reg. No. 38,614
Attorney/Agent for Applicant

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BROOKS KUSHMAN P.C.
1000 Town Center, 22nd Floor
Southfield, MI 48075-1238
Phone: 248-358-4400
Fax: 248-358-3351